The Monitoring Role of the Financial Press Around Corporate Announcements

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ABSTRACT: This study finds that the financial press serves an important monitoring role by interpreting the tone of corporate announcements, moderating its impact to market participants in the process. Using textual analysis, we report that the press attenuates both the positive and negative tone of firm-initiated disclosures. However, the effect is asymmetric with the media mostly downplaying the tone of highly positive corporate press releases, consistent with the premise that management disclosures containing highly positive tone are less convincing. In addition, we find that the tone of the information produced by the financial media has an effect on market reactions above and beyond the impact of the linguistic content of corporate disclosures. Importantly, the impact of the linguistic content of corporate disclosures to market returns is moderated by the tone of new information included in media articles. Overall, this study adds new evidence to a growing body of literature suggesting that the tone of press-originated articles contains incremental information content.

Keywords: financial press; corporate disclosure; tone; content analysis; information intermediary; information environment

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1. Introduction

The informational role of the financial press in capital markets has received increasing attention in recent years. Several studies identify a speculative role of the press and question its validity as a distributor of key information to financial markets (Jensen 1979, Core et al. 2008, Ahern and Sosyura 2015). Other studies argue that the press plays a significant role in enriching a firm's information environment, and hence serves as an important information intermediary (Miller 2006, Bushee et al. 2010, Tetlock 2010, Peress 2014). Furthermore, a large body of empirical literature finds strong correlations and even causal effects between media activity and stock market reactions, which it interprets as evidence of media usefulness to market participants (Engelberg and Parsons 2011, Dougal et al. 2012, Peress 2014, Rogers et al. 2016). This study tackles the question of the informational role of the press by investigating whether the linguistic characteristics extracted from the textual content of press-generated articles have incremental information content compared to that of firm-originated disclosures. Prior research examines the management- and media-issued content independently (Tetlock et al. 2008, Loughran and McDonald 2011b, Davis et al. 2012, Demers and Vega 2014). In contrast, we provide insights into the role of the financial press in the information transmission process relative to corporate disclosures. This not only allows us to identify the role of the press in analysing firm disclosures but also helps us offer direct evidence about the value of press-issued information to market participants by comparing the market reactions to firm-initiated and press-initiated related articles.

Managers use press releases to communicate information about their firms to market participants. They often choose to complement disclosures of quantitative performance with qualitative information; in fact, the use of optimistic or pessimistic language throughout financial disclosures can be a tool for managers to either improve investors' perceptions of firm fundamentals (Davis et al. 2012, Demers and Vega 2014) or misinform them (Huang et al. 2014). The financial media closely follows firms' announcements and could play an important role as

an information intermediary by broadly disseminating the key points of the news releases, by packaging information together from multiple sources, and by producing new information; in this way, the press mitigates asymmetry between differentially informed market participants (Bushee et al. 2010). In light of management's strategic reporting incentives to emphasise good or bad news in order to influence investors' perceptions about the firm upward or downward (Davis and Tama-Sweet 2012, Huang et al. 2014, Allee and Deangelis 2015), we expect financial journalists to offer a more balanced coverage when disseminating firm-initiated news, and thus to appear more prudent compared to firm managers. We refer to this as the interpretative role of the press. In addition, consistent with the financial press providing new material information to the investor community, we expect the linguistic content of financial media articles to be informative to market participants over and above that of corporate disclosures. Furthermore, we argue that the tone of new information included in the media articles is likely to moderate the impact of the linguistic content of corporate disclosures to market returns. We refer to this as the moderating role of the press.

Using a sample of over 27,000 financial performance-related disclosures issued by the constituent companies of the Standard and Poor's 500 index between January 2000 and December 2013, and over 74,000 related articles in the financial press from the Factiva database, we employ textual analysis to measure the tone of management- and media-issued content. Specifically, we create tone measures for corporate press releases and financial journalists' articles based on two general dictionaries, namely Diction 7 and LIWC 2015, and two finance-customised word lists developed by Henry (2008) and Loughran and McDonald (2011b). Our findings suggest that there is a significant positive association between the tone of firm-initiated disclosures and the tone of media articles about the firm, consistent with the information dissemination role of the media. Importantly, the financial press attenuates the tone of corporate disclosures, in keeping with its interpretative role. Even though the results hold both for positive and negative tone, the press downplays overly favourable disclosures to a greater extent, in line

with the premise that management disclosures containing highly positive tone are less convincing. We also present evidence that the market reaction on the day the corporate announcement and associated media articles are published is strongly related to 'abnormal media tone', that is, media tone that cannot be explained by press releases' tone or other firm characteristics, thus likely capturing the tone from new information generated by the media. This result is consistent with two alternative, non-mutually exclusive explanations. The first is that abnormal media tone is a driver of the market reaction to the news in the firm's press release. The second explanation is that abnormal media tone reflects the economic news contained in the firm's press release and other news entering the market price on that day. It is quite possible that the above result is due to a mixture of both explanations.[1] Importantly, we also find that abnormal media tone moderates the market reaction to the linguistic content of corporate disclosures, consistent with the moderating role of the press.

Given the focus of the extant literature on earnings release announcements (e.g., Rogers et al. 2011, Huang et al. 2014, Henry and Leone 2016) and the fact that the vast majority (i.e., approximately 70%) of corporate press releases in our sample are earnings announcements, we distinguish between 'earnings press releases' and 'other (non-earnings) press releases'. Our findings indicate that the financial press attenuates the tone of both earnings and non-earnings press releases. The effect is asymmetric for both types of firm announcements, with the media mostly downplaying highly positive (earnings and non-earnings) press releases. However, this effect is more pronounced for non-earnings press releases compared to earnings announcements. One could argue that managers have more discretion over the content of non-earnings disclosures compared to earnings-related ones, which are typically highly anticipated and scrutinised. Thus, the monitoring role of the media might be more important in non-earnings disclosures; our results are consistent with this conjecture. These findings have important implications with regards to

[1] In Section 4.4.2, we attempt to distinguish between these two alternative explanations using a subset of our sample.

the perceived credibility of different types of corporate disclosures and further highlight the monitoring role of the financial press.

An important argument in this study is that the media responds to corporate disclosures by publishing articles that reflect but also attenuate the tone of these disclosures. In Section 4.4.3, we use data on corporate disclosure and media article timings and show that reverse causality is not likely to explain our results. We also use a propensity score matching design to alleviate endogeneity concerns related to selection on observable characteristics (Shipman et al. 2017), and provide evidence that our inferences are not likely to be driven by confounding factors that determine the tone of both management- and media-issued content. We note here that throughout our analysis we include day of the week, month, year and firm fixed effects to capture unobservable heterogeneity, that is, control for the effect of unobservable variables that are constant over time as well as unobservable variables that are constant across firms. Still, we acknowledge that we cannot completely rule out the impact of omitted variables on our findings. However, we argue that collectively our results point to a causal effect of the tone of corporate press releases on the tone of media articles about the firm.

This study contributes to the extant academic literature along several dimensions. First, our paper is a response to the call by Miller and Skinner (2015) for investigation into the role of the media in financial markets, and offers robust evidence supporting the view that the financial press serves a monitoring role. In particular, on top of its information dissemination role, the media has an attenuation effect on the tone of corporate announcements. Second, our study relates to the literature that uses word-frequency measures to quantify the tone of corporate disclosures' and media articles' textual content. Unlike prior studies, we do not explore these two sources of information separately. Instead, we investigate the importance of the financial press in the information transmission process relative to firm disclosures, and find that abnormal media tone informs market reactions and moderates the impact of firm disclosure tone to market participants. Third, we distinguish between earnings and non-earnings announcements, and show

that financial journalists view management's favourable non-earnings disclosures with more scepticism compared to unfavourable (earnings or non-earnings) disclosures. Importantly, we also find that the press treats favourable non-earnings press releases with more suspicion compared to favourable earnings announcements. Finally, we make a methodological contribution to the literature on the textual analysis of financial information. Our analysis requires the classification of news as either press-generated or company-initiated and, as discussed in Section 3.3, our methodology is effective in distinguishing between the two mediums of disclosure dissemination and in accurately classifying articles. Overall, this study adds new evidence to a growing body of literature suggesting that media content, positive and negative, has incremental information.

The rest of the paper is organised as follows. Section 2 develops the paper's motivation in the context of the extant literature, and states our main hypotheses. Section 3 describes our research design, sample selection and data. Section 4 presents the main results and findings from sensitivity tests of our primary analysis. Section 5 summarises the paper.

2. Related Research and Hypotheses Development

2.1 The Role of the Financial Press as an Information Intermediary

Information asymmetry and agency conflicts between informed and uninformed market participants are mitigated through financial reporting and disclosure (Kothari et al. 2009a). Disclosures by information intermediaries potentially play a significant role in reducing further information differences and conflicting incentives between a firm's managers and its external stakeholders (Healy and Palepu 2001). As mentioned above, prior academic research often provides conflicting evidence about the value of the financial press as an information intermediary in the capital markets. On the one hand, there is evidence that the press plays a speculative role and, in their attempt to compete for readership, media outlets face incentives to publish attention-grabbing news stories, possibly at the expense of accuracy (Jensen 1979, Core

et al. 2008, Ahern and Sosyura 2015). On the other hand, some studies demonstrate that the media plays a significant role as a distributor of key information in financial markets (Tetlock 2010, Engelberg and Parsons 2011, Peress 2014). Dyck and Zingales (2002) and Miller (2006) suggest that the press has an investigative reporting role, and undertakes original investigation and analysis. According to this strand of literature, the financial press is increasingly recognised as a key player in enriching the firm's information environment.

2.2 The Relation between the Media and Stock Market Reactions

A large and growing body of literature has investigated the association between media activity and stock market activity (Klibanoff et al. 1998, Huberman and Regev 2001, Tetlock 2007, Peress 2008, Fang and Peress 2009). For example, Twedt (2016) shows that the market response is stronger for management earnings guidance when the guidance is disseminated through the financial press. Several recent studies extend this literature by documenting a causal effect of the media on trading activity and price formation (Engelberg and Parsons 2011, Dougal et al. 2012, Drake et al. 2014, Peress 2014). Rogers et al. (2016) use the process through which insider trading filings are made public to focus on the dissemination role of the media, given that media articles covering insider filings typically reiterate factual information in the filings. Their evidence suggests that the media plays a significant role in price formation by disseminating news more widely. Blankespoor et al. (2017) also examine the media's synthesis and dissemination role, and provide evidence consistent with algorithmic 'robo-journalism' articles, that is, automated articles about firms' earnings releases introduced by the Associated Press, increasing firms' trading volume and liquidity.[2]

[2] The Associated Press introduced the 'robo-journalism' technology in 2014; therefore, it is not relevant to our analysis, given that our sample period ends in 2013.

2.3 Tone Analysis of Corporate Disclosures and Media Articles

There is growing research in accounting and finance that employs linguistic analysis tools to analyse the qualitative information of corporate disclosures and media articles (Huang et al. 2014).[3] These studies typically examine whether the various qualitative dimensions of the disclosures (e.g., positive versus negative tone) contain incremental information content, or investigate factors that result in cross-sectional differences in the disclosure tone (Henry and Leone 2016). The literature that uses textual analysis on firm-initiated disclosures/filings, such as the Management Discussion & Analysis section (MD&A) of 10-K and 10-Q filings and earnings announcements, is extensive (Kothari et al. 2009a, Loughran and McDonald 2011a, 2011b, Davis and Tama-Sweet 2012, Price et al. 2012, Davis et al. 2015, Loughran and McDonald 2015). For example, Davis et al. (2012) and Henry (2006, 2008) document an association between earnings announcement returns and the tone of the announcement. Using a sample of non-earnings 8-K filings, Segal and Segal (2016) provide evidence that managers engage in strategic reporting by delaying and obfuscating the release of negative news. Overall, the above studies show that the tone of corporate disclosures is related to both current and future firm performance as well as strategic incentives.

Important work on tone analysis of press-initiated articles includes Chen et al. (2014), Core et al. (2008), Hooghiemstra et al. (2015), Sinha (2016), Tetlock (2007), and Tetlock et al. (2008). Kothari et al. (2009a) study the impact of disclosures by management, analysts and news reporters on the firm's capital market environment. They show that positive (negative) media coverage results in decreased (increased) cost of capital, stock return volatility, and analyst forecast dispersion. Garcia (2013) studies the relationship between the tone of financial news from the *New York Times* and stock returns during 1905 to 2005, and demonstrates that the predictability of stock returns is concentrated in economic downturns. Ahmad et al. (2016)

[3] See Loughran and McDonald (2016) for an overview of textual analysis in accounting and finance. Kearney and Liu (2014) also provide a survey of the textual sentiment literature.

conduct a time-varying analysis of the relation between media-expressed firm-specific tone and firm-level returns, and find that, rather than being a source of noise, media content can sometimes contain new fundamental information about firm value.

2.4 Hypotheses Development

Managers recognise the importance of press releases as a means of communicating information about their firms, while this disclosure channel also allows them to manage their firms' information environments by exercising discretion over what to disclose and when to disclose it (Miller and Skinner 2015). Since the information contained in corporate press releases is typically price sensitive and important to the investor community, this creates scope for the media to respond to it and facilitate communication between managers and investors by serving as a useful information intermediary; specifically, the media is expected, not only to rebroadcast and broadly disseminate material and accurate information contained in firm disclosures, but also to produce new relevant information that is useful to other parties (Bushee et al. 2010, Drake et al. 2014, Dai et al. 2015). Through these activities, the financial press acts as an external (to the firm) monitoring mechanism and reduces information asymmetry between managers and investors (Miller and Skinner 2015, Rogers et al. 2016). Evidence reveals that managers' use of positive or negative language is likely to influence market participants' perceptions about firm performance (Davis et al. 2015). Consistent with the information dissemination role of the financial press, optimistic or pessimistic tone expressed in corporate disclosures is naturally expected to also have an effect on journalists' tone used in related articles in the financial press. In other words, we expect that the linguistic content of financial performance-related corporate disclosures is associated with the linguistic content of subsequent financial performance-related media articles about the firm. Thus, we conjecture that the tone of financial media articles on trading day *t* exhibits a consistent positive association with the tone of firm disclosures to which the media articles refer, which yields the following hypothesis:

Hypothesis (1a)

There is a significant positive association between the tone of financial performance-related corporate press releases and the tone of financial performance-related media articles about the firm.

The disclosure literature suggests that managers face incentives to report strategically and frequently use qualitative statements to present information in a more favourable manner (Rogers et al. 2011, Davis and Tama-Sweet 2012, Huang et al. 2014). Qualitative disclosures, by nature, provide managers with opportunities to exercise discretion. For example, Davis and Tama-Sweet (2012) find strong (limited) evidence that managers report less pessimistic (more optimistic) language in earnings press releases relative to MD&A disclosures when facing strategic reporting incentives. In light of management's incentives to report good news,[4] Kothari et al. (2009a) argue that management's positive disclosures may not be credible to the investment community. Additionally, Kothari et al. (2009b) provide evidence that managers, on average, tend to accumulate and withhold bad news up to a certain threshold. Allee and Deangelis (2015) study the extent to which tone is evenly dispersed throughout the managers' disclosure narrative in earnings conference calls, and suggest that managers draw attention to bad news and away from good news in order to smooth expectations of extreme performance. Given the above findings, we posit that, apart from being informative (Davis et al. 2012, Demers and Vega 2014), the tone of corporate communications can also be a tool for managers to influence investors' perceptions of and expectations about the firm. Importantly, Huang et al. (2014) show that the disclosure tone of earnings press releases contains a non-discretionary component that reflects economic fundamentals, and a discretionary component that reflects managerial strategic choice of tone to misinform investors. They contend that managers may engage in opportunistic tone

[4] Watts and Zimmerman (1986) and Fields et al. (2001) discuss managers' motivations to favourably skew their disclosures.

management '*by being unduly positive or negative relative to the reported quantitative information even when this leads to a less accurate perception of fundamentals*' (p. 1084). Bearing in mind the media's monitoring role of firms' activities (Miller 2006, Miller and Skinner 2015), we anticipate the tone of financial media articles to be correlated with the 'true' component of corporate disclosure tone, that is, the tone that reflects fundamental performance, and uncorrelated with the component of tone that captures managerial strategic discretion (i.e., spin) or noise. In other words, we expect the media to interpret the tone of corporate disclosures. Assuming the financial press offers a balanced and informative representation of corporate disclosures, one would expect it to attenuate the exceedingly positive or highly negative tone of corporate announcements.

Furthermore, the media's ultimate objective is to attract greater readership (Bushee et al. 2010). This gives journalists an exceptional interest in enhancing their fame and reputation (Fengler and Ruß-Mohl 2008), which increase visibility and ultimately readership. Given that the media's business model places great value on reputation, we argue that financial journalists are likely to face asymmetric reputational costs for inaccuracy in disseminating information included in corporate disclosures. We conjecture that the reputational cost of not seeing through biased managerial information should be much higher to the media compared to the cost of appearing too prudent.[5] Thus, one should expect that the media adopts a more prudent tone relative to the corporate disclosure tone.

Considering the above discussion and managers' tendency to either put a positive spin on reported performance or engage in 'big bath' reporting, we predict that financial journalists, in their effort to offer balanced coverage, attenuate the tone of highly positive or overly negative firm press releases. Consequently, we construct the following hypothesis:

[5] Financial analysts are other information intermediaries that also have asymmetric loss functions (Clatworthy et al. 2012). Ramnath et al. (2008) review the literature examining the role of financial analysts in capital markets.

Hypothesis (1b)

The financial media attenuates the tone of financial performance-related corporate press releases.

As discussed in Sections 2.2 and 2.3, several prior papers relate the tone expressed in various corporate disclosures to measures of firm profitability, financial market outcomes as well as managerial opportunistic behaviour. A number of studies also examine the market reaction to press-issued textual content, suggesting that the financial press plays a substantive role in the equity markets (Bushman et al. 2017). Building on this line of research, we quantify textual content emanating both from corporate press releases and related financial media articles about the firm, and examine whether abnormal (i.e., residual) media tone, that is, media tone above and beyond what corporate press releases' tone and various firm characteristics can explain, is incrementally informative to the market. Abnormal media tone is likely to capture the tone of new information generated by financial journalists, consistent with the information creation role of the financial press (Bushee et al. 2010). We naturally expect the underlying corporate event or information ('economic news') to be correlated with the corporate disclosure's and related media articles' tone; still, if financial media articles provide new information over and above that provided by the firm or other information intermediaries, we expect abnormal media article tone to be a significant determinant of the market reaction to the underlying economic news about the firm on the announcement day. This association would be consistent with either the abnormal media tone being a driver of market reaction to the news included in the press release or the abnormal media tone capturing the economic news about the firm, which also drive the market reaction. Therefore, we examine the informativeness of abnormal media tone after controlling for the tone of firm announcements. Thus, assuming market efficiency and controlling for the tone of corporate press releases issued on trading day *t*, we conjecture that the market reaction to the corporate press releases is positively correlated with the abnormal component of the tone

of press-initiated articles issued on the same day. As such, we formulate the following hypothesis:

Hypothesis (2a)

Controlling for the tone of financial performance-related corporate press releases, the market response to the corporate press releases is positively related to the abnormal component of tone of financial performance-related media articles about the firm.

Consistent with the media's information creation role (Bushee et al. 2010), the tone of new information produced by the media is expected to influence the firm information environment incrementally to the effect of firm-initiated disclosures, thus, we predict that abnormal media tone affects price reactions significantly. Furthermore, we argue that abnormal media tone has a moderating impact on the effect of corporate press release tone on stock market reactions, since market participants react to the tone of this new information procured by the media and not only to the tone of the corporate press release. The greater the abnormal media tone is the higher its impact on market participants, hence, the lower the ability of the tone of corporate press releases to influence price reactions. In other words, although prior research documents a positive association between the tone of firm-initiated disclosures and the market response to these disclosures (e.g., Davis et al. 2012, Henry and Leone 2016), we expect press release tone to matter less to market participants when the tone of new information provided by the media is more positive. In fact, prior literature broadly documents that financial media coverage tends to be negative (Tetlock 2007, Core et al. 2008, Ahern and Sosyura 2015), while Tetlock (2007) proposes that high levels of media pessimism could be associated with noninformational trading or risk aversion. Thus, we expect that market participants are likely to react more to abnormal media tone relative to corporate press release tone when abnormal media tone is more positive. Therefore, although we predicted above that the unexplained component

of media tone is value relevant to market participants, we further hypothesise that the financial press plays a moderating role, that is, abnormal media tone affects (i.e., moderates) the strength of the relation between corporate press release tone and market responses. As such, controlling for the tone of corporate press releases issued on trading day *t* and the abnormal component of the tone of press-initiated articles issued on the same day, we conjecture that the market reaction to the corporate press releases is negatively correlated with the product of abnormal media tone and corporate press release tone.

Hypothesis (2b)

The market response to the tone of financial performance-related corporate press releases is moderated by the abnormal component of tone of financial performance-related media articles about the firm.

3. Research Design, Sample Selection and Data

3.1 Quantifying Tone

Similar to prior research, we employ a form of content analysis that involves counting words characterised as 'positive' or 'optimistic', and 'negative' or 'pessimistic', based on predefined word lists. This approach, known as the dictionary or rule-based approach, entails using a mapping algorithm in which a computer program classifies the words of a document into groups based on predefined categories (Li 2010, Henry and Leone 2016).

3.1.1 General and Domain-Specific Word Lists

We examine four word lists used in capital markets research to compute a tone measure: a domain-specific word list developed in Loughran and McDonald's (2011b) analysis of the MD&A section of 10-K filings (LM); a domain-specific word list developed in Henry's (2006, 2008) analysis of earnings announcements (Henry); a general word list from the Linguistic

Inquiry and Word Count 2015 software (LIWC); and a general word list from the Diction 7.0 software (Diction). The LM and Henry word lists are specific to the domain of financial communication, while the Diction and LIWC word lists have been applied in a wide variety of settings, including presidential speeches (Bligh et al. 2004) and newspaper articles (Hooghiemstra et al. 2015).

Our choice to use the LM, Henry, Diction and LIWC word lists is motivated by the fact that the extant accounting and finance literature uses extensively both general and finance-specific word lists. Li (2010) and Loughran and McDonald (2011b, 2015) criticise the use of general word lists to calculate tone in the context of corporate filings, because these dictionaries have not been created with financial text in mind. For example, Loughran and McDonald (2015) show that approximately 83% of the Diction optimism and 70% of the Diction pessimism word frequencies appearing in a large 10-K sample suffer from the potential word misclassification problem. Henry and Leone (2016) also suggest that capital markets researchers aiming to measure the tone of financial narrative can increase the power of their tests by using domain-specific word lists, such us the LM and Henry dictionaries. Nevertheless, Davis et al. (2015) argue that '*there is currently no consensus in the literature regarding which one* [word list] *is the most appropriate for the analysis of tone in contexts such as financial disclosures*' (p. 645). In addition, Loughran and McDonald (2016) highlight that the application of the LM dictionary, which is specific to the context of 10-K filings, is likely to be problematic without modification to other media. We note that this is not the case in our setting, since we focus on press releases and media articles related to firms' financial performance. In particular, Loughran and McDonald (2011b) examine the generalisability of their word lists to other financial documents, and argue that their lists could be applied successfully to other documents, such as newspaper articles or press releases.

We create average tone measures for press releases and related media articles, based on the above four word lists to ensure that our results are not driven by a particular list. However,

we also report our main results based on each tone score separately, which helps us examine the extent to which our inferences are sensitive to the use of general and domain-specific dictionaries.

3.1.2 Construction of Tone Measures

We attempt to decipher media articles' and press releases' tone by using frequency counts of positive and negative words from the Diction, LIWC, Henry and LM dictionaries. Diction does not have direct sentiment categories of positive and negative words; hence, we follow Davis et al. (2012), Loughran and McDonald (2015), and Rogers et al. (2011), and extract the optimism-increasing words tabulated in the three subgroups of *praise*, *satisfaction*, and *inspiration*, and the optimism-decreasing words tabulated in the three subgroups of *blame*, *hardship*, and *denial*. The word lists from Diction include 677 unique optimistic (hereafter positive) and 904 unique pessimistic (hereafter negative) words. The LIWC word lists contain 620 positive emotion (hereafter positive) and 744 negative emotion (hereafter negative) words. The Henry word list includes a total of 104 positive and 85 negative words. The positive and negative LM word lists contain 354 and 2,355 words, respectively.

For each media article (press release), we compute alternative tone measures. We have developed an algorithm in Java that counts the number of positive and negative words for each media article and press release separately. Specifically, the tone of media article *i* (press release *j*) is measured alternately using the LM, Henry, Diction, and LIWC word lists as the difference between positive and negative words, scaled by the sum of positive and negative words:[6]

$$\mathrm{MATone}_{i,s} = \frac{\mathrm{POS}_{i,s} - \mathrm{NEG}_{i,s}}{\mathrm{POS}_{i,s} + \mathrm{NEG}_{i,s}} \quad (1)$$

and

[6] We follow Henry and Leone (2016) in estimating tone in equations (1) and (2). As an alternative measure, we define media articles' and press releases' tone scores as the difference between positive and negative words, scaled by the total word count in the document. Our inferences remain unchanged.

$$\mathrm{PRTone}_{j,s} = \frac{\mathrm{POS}_{j,s} - \mathrm{NEG}_{j,s}}{\mathrm{POS}_{j,s} + \mathrm{NEG}_{j,s}} \quad (2)$$

where $MATone_{i,s}$ is the tone measure for media article *i*, based on word list *s* (i.e., $MATone_{i,LM}$, $MATone_{i,Henry}$, $MATone_{i,Diction}$, $MATone_{i,LIWC}$); $PRTone_{j,s}$ is the tone measure for press release *j*, based on word list *s* (i.e., $PRTone_{j,LM}$, $PRTone_{j,Henry}$, $PRTone_{j,Diction}$, $PRTone_{j,LIWC}$); $POS_{i,s}$ ($POS_{j,s}$) is the total frequency of positive words in word list *s*, found in media article *i* (press release *j*); and $NEG_{i,s}$ ($NEG_{j,s}$) is the total frequency of negative words in word list *s*, found in media article *i* (press release *j*). Similar to Loughran and McDonald (2011b) and Huang et al. (2014), we consider negation for the positive words across all four dictionaries. If a negation word (*no*, *not*, *none*, *neither*, *never*, and *nobody*) occurs within three words preceding a positive word, we count the positive word as negative.[7] We then construct the following tone measures for each trading day *t*:

$$\mathrm{MATone}_{s} = \frac{\sum_{i=1}^{N_{MA}} \mathrm{MATone}_{i,s}}{N_{MA}} \quad (3)$$

and

$$\mathrm{PRTone}_{s} = \frac{\sum_{j=1}^{N_{PR}} \mathrm{PRTone}_{j,s}}{N_{PR}} \quad (4)$$

where $MATone_s$ ($PRTone_s$) is the mean of the tone scores of the media articles (press releases) issued on trading day *t*, based on word list *s*; and N_{MA} (N_{PR}) is the number of media articles (press releases) issued on trading day *t*. To arrive at a single overall tone measure of media articles ($MATone_{AVG}$) and press releases ($PRTone_{AVG}$) issued on trading day *t*, we compute the following tone measures:

$$\mathrm{MATone}_{AVG} = \frac{\mathrm{MATone}_{LM} + \mathrm{MATone}_{Henry} + \mathrm{MATone}_{Diction} + \mathrm{MATone}_{LIWC}}{4} \quad (5)$$

and

[7] We do not account for negation for the negative word lists, as they are unlikely to occur (Loughran and McDonald 2011b, Loughran and McDonald 2016).

$$\text{PRTone}_{\text{AVG}} = \frac{\text{PRTone}_{\text{LM}} + \text{PRTone}_{\text{Henry}} + \text{PRTone}_{\text{Diction}} + \text{PRTone}_{\text{LIWC}}}{4} \quad (6)$$

Therefore, our tone measures are bounded between −1 and +1; a purely positive (negative) media article or press release would have a score of +1 (−1), while a perfectly neutral article or release would have a score of 0.

3.2 Research Design

We use the following models to test H1a and H1b and identify whether there is a significant positive relation between firm *q*'s tone of firm-initiated announcements and the tone of press-initiated articles about firm *q* on trading day *t*, and whether the financial press attenuates the tone of firm *q*'s press releases issued on trading day *t* (omitting time and firm subscripts for simplicity):

$$\text{MATone}_{\text{AVG}} = \gamma_0 + \gamma_1 \text{PRTone}_{\text{AVG}} + \gamma_j \text{CONTROLS} + \gamma_k \text{DAY} + \gamma_l \text{MONTH} + \gamma_m \text{YEAR} + \gamma_n \text{FIRM} + \varepsilon, \quad (7a)$$

and

$$\text{MATone}_{\text{AVG}} = \gamma_0 + \gamma_1 \text{PRTone}_{\text{AVG}} + \gamma_2 \text{PRDummy}_{\text{AVG}} + \gamma_3 \text{PRTone}_{\text{AVG}} * \text{PRDummy}_{\text{AVG}} + \gamma_j \text{CONTROLS} + \gamma_k \text{DAY} + \gamma_l \text{MONTH} + \gamma_m \text{YEAR} + \gamma_n \text{FIRM} + \varepsilon, \quad (7b)$$

where the dependent variable $MATone_{AVG}$ is the tone of the financial performance-related media article(s) about firm *q* on trading day *t*; $PRTone_{AVG}$ is the tone of the financial performance-related press release(s) issued by firm *q* on trading day *t*; and $PRDummy_{AVG}$ is an indicator variable that takes the value 1 if $PRTone_{AVG}$ is greater that its median value (by year-quarter) in the sample, and 0 otherwise. In order to test H1a, we estimate equation (7a) and predict a positive and significant coefficient for γ_1, consistent with the information dissemination role of the media. A coefficient on $PRTone_{AVG}$ equal to one would suggest that financial journalists communicate firm press releases to the public without changing their content or creating new

information. Thus, the view that the media attenuates the tone of corporate press releases is supported if the coefficient for γ_1 is significantly less than one (H1b), while the inclusion of *PRDummy*$_{AVG}$ and the interaction term in equation (7b) also allows us to test whether this effect is more pronounced for more or less favourable firm announcements. CONTROLS is a vector of variables that controls for other factors that affect the tone of media articles about firm *q* on trading day *t*, DAY represents weekday fixed effects, MONTH represents month fixed effects, YEAR represents year fixed effects, FIRM represents firm fixed effects, and ε is the regression error term.

Regarding hypotheses H2a and H2b, we model the market response to the economic news announced at the time of publication of the corporate press release and examine whether the unexplained component of media tone (i.e., abnormal media tone) is a significant determinant of the market reaction and whether it affects the strength of the relationship between press release tone and the market reaction. In particular, we estimate equation (8a) to examine whether the market reaction to the underlying event or information is related to the abnormal tone of financial media articles about firm *q* on trading day *t* after controlling for the tone of firm *q*'s corporate press release on the same day (time and firm subscripts are suppressed). In equation (8b), we also include the interaction term *PRTone*$_{AVG}$ * *MARESID*$_{AVG}$, which allows us to examine whether the media plays a moderating role, that is, whether abnormal media tone influences the relation between press release tone and market responses:

$$\text{ABRET (\%)} = \gamma_0 + \gamma_1 \text{PRTone}_{\text{AVG}} + \gamma_2 \text{MARESID}_{\text{AVG}} + \gamma_j \text{CONTROLS} + \gamma_k \text{DAY} + \gamma_l \text{MONTH} + \gamma_m \text{YEAR} + \gamma_n \text{FIRM} + \varepsilon, \quad (8a)$$

and

$$\text{ABRET (\%)} = \gamma_0 + \gamma_1 \text{PRTone}_{\text{AVG}} + \gamma_2 \text{MARESID}_{\text{AVG}} + \gamma_3 \text{PRTone}_{\text{AVG}} * \text{MARESID}_{\text{AVG}} + \gamma_j \text{CONTROLS} + \gamma_k \text{DAY} + \gamma_l \text{MONTH} + \gamma_m \text{YEAR} + \gamma_n \text{FIRM} + \varepsilon, \quad (8b)$$

where the dependent variable *ABRET (%)* is the percentage abnormal returns on trading day *t*, measured as the difference between firm *q's* stock returns and the returns on the S&P 500 index on media article and corporate disclosure day *t*, multiplied by 100; and $MARESID_{AVG}$ is abnormal media tone, measured as the regression residual from equation (7a). CONTROLS is a vector of variables that controls for other factors that affect firm *q*'s abnormal returns on trading day *t*; and ε is the regression error term. All remaining variables are defined in Table 1.

[Insert Table 1 here]

To further support our conjectures on the relation between media articles' and press releases' tone, and their association with the corresponding market reaction to the underlying information content or news, we also re-estimate equations (7a), (7b), (8a) and (8b) using an alternative model specification based on industry fixed effects using the Fama and French (1997) 48 industry classification (untabulated)[8]. In all models, we estimate robust standard errors clustered at the firm level.

3.3 Press Releases and Financial Media Data

We obtain data on financial performance-related corporate press releases and media articles about those releases between 2000 and 2013 from the Factiva database. Following Ahern and Sosyura (2014), Bushee and Miller (2012), Core et al. (2008), Engelberg (2008), Solomon (2012) and Soltes (2010), we employ Factiva's intelligent indexing codes, that is, unique keys assigned to each firm by the database, to download media articles. In this way, we ensure that we identify only relevant articles that discuss a firm in sufficient detail, and not ones that simply mention the company's name in passing. Similar to Ahern and Sosyura (2014) and Core et al. (2008), we collect English-language press-initiated articles included in Factiva's category of Major News and Business Publications (intelligent indexing code: rst=tmnb), such as *The Wall Street Journal*

[8] The untabulated pooled OLS regression results are available upon request from the authors.

and *The New York Times*, with the exception of press release wires through which firms initiate their disclosures. Hence, we collect articles from publications that exercise editorial control over their content (Bushee et al. 2010, Ahern and Sosyura 2014). We also apply Factiva's expert search tool 'Financial Performance' to obtain financial performance-related media articles.

Following Bushee and Miller (2012), Bushee et al. (2010) and Core et al. (2008), we assume that all articles carried on Factiva's category of press release wires (intelligent indexing code: rst=tprw), such as *PR Newswire* and *Business Wire*, are company-initiated disclosures. Unlike these studies, we also include all articles coded as press releases by Factiva (intelligent indexing code: ns=npress). Taking into consideration that press releases almost always contain the issuing company's name in the headline, we require the company's name, or alternative names, to be included in the release's headline. However, this procedure is not sufficient to determine whether a press release was issued by the company of interest. Similar to Soltes (2010), we also require the company's name, or alternative names, or official website (if necessary), to be included in the contact (CT) field that is found at the bottom of each press release and contains the issuing company's contact information.[9] The use of the contact information allows us to accurately classify articles (Soltes 2010). We download financial performance-related firm-initiated disclosures through the application of 'Financial Performance' indexing (intelligent indexing code: ns=c15). In line with Ahern and Sosyura (2014), we eliminate corporate disclosures with fewer than 50 words as an additional filter of getting meaningful results.[10]

[9] We have noticed that most press releases issued in 2003 do not contain a separate contact field, probably because they were not mapped correctly when Factiva improved its contact mapping during the same year; instead, the releases display the contact information at the bottom of the main text prefixed with 'CONTACT'. Consequently, in order to download press releases issued in 2003, we require at least one of the company's name, alternative names, ticker or website to be included in the first five words following the word 'CONTACT' when the latter is found in the main text of the press release.

[10] For example, we locate press releases issued by International Business Machines Corporation, commonly referred to as IBM, through the following search:
(rst=tprw OR ns=npress) AND wc>50 AND ns=c15 AND ((hd=International Business Machines) OR (hd=International Bus. Machines) OR (hd=IBM) OR (hd=Intnl Bus. Mach)) AND ((CT=International Business Machines) OR (CT=International Bus. Machines) OR (CT=IBM) OR (CT= Intnl Bus. Mach))

3.4 Sample Selection

We consider all firms included in the Standard & Poor's 500 index between years 2000 and 2013. Our focus on large U.S. companies is motivated by the fact that the S&P 500 index covers about three-quarters of the American equity market by capitalisation (Tetlock et al. 2008). Consequently, these firms appear in the news very often and this increases the importance of our analysis. Our sample covers the period from the year of introduction of Regulation Fair Disclosure, commonly referred to as Regulation FD or Reg FD, which is a regulation that was promulgated by the U.S. Securities and Exchange Commission (SEC) in 2000 and mandates that all publicly traded companies must disclose material information to all investors at the same time. In addition, we decide to begin our sample in 2000 because Factiva's coverage is limited in earlier years (Ahern and Sosyura 2014). This gives us an initial sample of 282,406 financial performance-related media articles and 90,472 financial performance-related corporate disclosures collected from the Factiva database. From the initial 835 firms, we eliminate 4 double entries and 67 companies that are included in the S&P 500 index for less than 12 months. The application of these criteria yields a sample of 278,475 media articles and 87,835 corporate disclosures. We identify and remove 1,837 and 312 duplicate media articles and press releases, respectively, as well as 44,003 media articles and 8,183 press releases that are issued on a non-trading day, or on a trading day for which full data are unavailable. To examine the effect of the tone of corporate disclosures on the tone of media articles, we further drop firm-day observations for which there is no financial press coverage, or no corporate disclosure. This process yields a final sample of 74,284 media articles and 27,281 press releases. The 736 companies left in our sample provide 24,535 firm-day observations from January 2000 to December 2013.

The objective of the above free text search is to identify all financial performance-related press releases issued by International Business Machines Corporation, and not releases that simply mention the company's name, or articles issued by services discussing many firms including IBM.

We obtain the data for our analysis from several sources, namely Factiva (press release and financial media data), Compustat (accounting data), CRSP (stock information), and I/B/E/S (analyst data).

4. Results and Robustness Tests

4.1 Descriptive Statistics

Table 2 shows that there is significant intra-week variation in the counts of media articles and press releases. The frequency of media articles per day increases from 7,505 (10.1%) on Mondays to 24,206 (32.6%) on Thursdays, followed by a decline to just 6,761 (9.1%) on Fridays. We observe a similar pattern for corporate disclosures. In line with DeHaan et al. (2015) and Dellavigna and Pollet (2009), we find that 32.6% (8.7%) of the firm disclosures in our sample are made on Thursdays (Fridays). In addition, according to the intra-year distribution of corporate disclosures, 57% of these disclosures occur during the months S&P 500 firms issue their quarterly reports, that is, January, April, July and October. Interestingly, almost 58% of the media articles are issued during the same months, a finding we interpret as evidence that the media follows the corporate quarterly reporting cycle, which is consistent with media focusing on newly released corporate information. Lastly, untabulated results show that the tone of media articles is on average lower than the tone of corporate announcements for almost all weekdays, months and years under examination. This finding is consistent with our conjecture that the media on average attenuates the tone of press releases.

[Insert Table 2 here]

Panel A of Table 3 presents descriptive statistics for the raw values of key variables used in this study. The median (lower quartile, upper quartile) tone of corporate press releases is 0.252 (0.074, 0.443) with a standard deviation of 28.1%, while the median (lower quartile, upper quartile) tone of the associated media articles is significantly lower with a value of 0.186 (−0.053, 0.425) and a standard deviation of 33.2%. This lends initial support to our argument that the

financial media attenuates the tone of corporate press releases (i.e., H1b) which is formally tested in the next section. During the sample period, the average earnings surprise is −0.018%, and approximately 11% of sample firms report negative earnings. The average (median) firm appears in 3.028 (2) financial media articles per trading day, has an abnormal return of 0.148% (0.063%), and is followed by 18.166 (18) analysts.

Panel B of Table 3 reports the descriptive statistics for the individual tone scores of our sample of 74,284 media articles and 27,281 firm disclosures. The mean and median values of $PRTone_{LM}$, $PRTone_{Henry}$, and $PRTone_{Diction}$ are, respectively, significantly more positive than the mean and median values of $MATone_{LM}$, $MATone_{Henry}$, and $MATone_{Diction}$. Therefore, the univariate mean and median differences of these tone measures are consistent with our supposition that corporate disclosures are, normally, significantly more positive in tone than the financial media articles about them.

[Insert Table 3 here]

4.2 Pairwise Correlations

Table 4 reports a positive and significant correlation between $MATone_{AVG}$ and $PRTone_{AVG}$ (0.364), which is consistent with H1a, and reveals that there is a strong positive association between the tone of corporate press releases and the tone of financial media articles. We also find that *ABRET* is positively correlated with both tone measures but more highly so with $MATone_{AVG}$ (0.146) than with $PRTone_{AVG}$ (0.051). This preliminary result attests to the fact that the tone in which media articles and press releases are written possibly conveys valuable information to market participants. Further, earnings surprise is significantly positively associated with both tone measures. Larger firms are also more positively correlated with $PRTone_{AVG}$ (0.188) than with $MATone_{AVG}$ (0.102). The absolute values of the correlation

coefficients are mostly under 0.50, suggesting that multicollinearity is not a concern in our sample.[11]

[Insert Table 4 here]

4.3 Main Results

4.3.1 Test of Hypotheses 1a and 1b

We investigate the monitoring role of the financial press by examining first the association between the tone of corporate disclosures and the tone of related financial media articles about firms' financial performance. In Table 5, we estimate equations (7a) and (7b) and present the results of our multivariate regressions on the tone of press-initiated articles. In column 1, we report the results using OLS regression of $MATone_{AVG}$ on $PRTone_{AVG,}$ with day, month, year, and firm fixed effects. The estimated coefficient on $PRTone_{AVG}$ (0.395) is positive and statistically significant at the 1% level (t-statistic = 24.06), suggesting that there is a significant positive association between the tone of firm-originated releases and that of press-generated articles. Consistent with our expectations in H1b, we also find that the coefficient on $PRTone_{AVG}$ is significantly less than one at the 1% level. In column 2, we include in the regression a set of control variables that, according to prior research, affect media tone, and show that our inferences remain the same. According to these regression results, media tone is lower for firms with high idiosyncratic volatility and book-to-market ratio. Leverage and share turnover do not have an effect on the tone of press-initiated articles. In column 3, we distinguish between the above-median and the below-median tone scores of corporate disclosures by including the variable $PRDummy_{AVG}$ and the interaction between $PRTone_{AVG}$ and $PRDummy_{AVG}$, and test how the press responds to different levels of the tone of firm-initiated disclosures (asymmetric effect). In the extreme case financial journalists simply disseminated the corporate disclosures without changing any of their content or adding any additional information, we would expect the

[11] Untabulated variance inflation factors (VIFs) are consistently less than 3, while 10 is the usual threshold suggested as indicative of multicollinearity (Chatterjee and Price 1991, Baum 2006).

coefficient on $PRTone_{AVG}$ to be equal to one, and the coefficients on $PRDummy_{AVG}$ and the interaction term to be zero in magnitude. Our regression results show that the coefficients on the variables of interest are not only highly statistically different from zero, but also economically significant. Specifically, the coefficient on $PRTone_{AVG}$ is 0.514 (t-statistic = 19.66), while the coefficients on $PRDummy_{AVG}$ and $PRTone_{AVG}$ * $PRDummy_{AVG}$ are 0.128 (t-statistic = 9.97) and −0.324 (t-statistic = −8.51), respectively; increasing the below-median (above-median) tone of corporate disclosures by one, is predicted to increase, ceteris paribus, the tone of related press-initiated articles about the firm by 0.514 (0.190). Therefore, our findings suggest that financial journalists attenuate the tone of firm-initiated disclosures. Even though the results hold both for above-median and below-median tone (i.e., more and less favourable disclosures, respectively), the significantly negative interaction term illustrates that the effect is asymmetric. In fact, we find that the financial press downplays the tone of overly favourable corporate disclosures more, which indicates the media's efforts to offer balanced coverage in particular with respect to attenuating management's exceedingly positive news disclosures. In column 4, we include in the regression the relevant control variables, and show that the results on the main variables of interest remain unchanged. The statistical and economic significance of the results in columns 1-4 does not change when controlling for industry-specific time-invariant unobservable factors (untabulated). Overall, the regression results in Table 5 are consistent with hypotheses H1a and H1b.

[Insert Table 5 here]

4.3.2 Test of Hypotheses 2a and 2b

In Table 6, we estimate equations (8a) and (8b) to investigate the role of the financial press in the information transmission process relative to corporate announcements. We attempt to disentangle the association of corporate press release tone and abnormal media tone with the market reaction to the underlying corporate event or news as measured by the abnormal returns

on the media coverage and corporate disclosure day.[12] Specifically, in column 1, we examine the market reaction (*ABRET*) to the tone of corporate press releases ($PRTone_{AVG}$) and abnormal media tone ($MARESID_{AVG}$), which is estimated as the residual component from the regression in column 2 of Table 5, and is our proxy for the tone of the new information generated by the media. In columns 2 to 4, we also include in the regressions the interaction term $PRTone_{AVG}$ * $MARESID_{AVG}$, which allows us to test whether the abnormal media tone moderates the relation between press release tone and market reaction. The four regression specifications we present in Table 6 are for the full sample (columns 1 and 2), and for subsamples of above-median (column 3) and below-median (column 4) press release tone. All the regressions account for year, month, and day of the week fixed effects as well as for firm fixed effects; these effects capture constant time-specific and firm-specific factors not explicitly captured in the regression equations. Our results remain unchanged after controlling for industry (instead of firm) fixed effects (untabulated).

In column 1 of Table 6, we find that the coefficient on $PRTone_{AVG}$ is positive and significant at the 1% level (coefficient = 0.926; t-statistic = 10.47), meaning that the tone of corporate press releases is positively associated with the market reaction to the underlying information content of the disclosures. This finding is in line with prior research suggesting that management-issued textual content has incremental information content.[13] Importantly, we also find that the coefficient on $MARESID_{AVG}$ is positive and significant at the 1% level (coefficient = 1.812; t-statistic = 21.13), suggesting that the unexplained component of media tone is incrementally informative to the market, consistent with hypothesis H2a. In fact, the coefficient on $MARESID_{AVG}$ is significantly different from the coefficient on $PRTone_{AVG}$ at the 1% level

[12] Our findings remain robust to alternative windows of market reaction, such as the cumulative abnormal returns over the three-day window centered on the media coverage and corporate disclosure date.

[13] For example, Davis et al. (2012) use a sample of approximately 23,000 quarterly earnings press releases and report that the unexpected level of net optimistic language in earnings press releases is positively associated with market returns around the earnings announcement date. They conclude that market participants perceive managers' language to be –at least to some extent− credible, despite managers' potential incentives to disclose opportunistically. Similar to Davis et al. (2012), Demers and Vega (2014) analyse a sample of more than 20,000 earnings announcements and also find that unexpected managerial textual net optimism is priced by the market.

(untabulated), while the size of the coefficient on $MARESID_{AVG}$ is also almost twice that of the coefficient on $PRTone_{AVG}$, meaning that it is much more economically significant. In other words, consistent with the media providing original material information to the investment community, we provide evidence that the linguistic content of financial media articles is informative to market participants over and above that of corporate press releases.

In column 2 of Table 6, after the inclusion of the interaction term, the economic and statistical significance of the coefficient on $PRTone_{AVG}$ (γ_1) is relatively unchanged, while the coefficient on $MARESID_{AVG}$ (γ_2) remains positive and significant at the 1% level; consistent with our expectations, the coefficient on the interaction term (γ_3) is significantly negative. The sum of the coefficients on $PRTone_{AVG}$ and the interaction term (i.e., $\gamma_1+\gamma_3$) is equal to 0.494, which is significantly different from the coefficient on $PRTone_{AVG}$, indicating that the residual component of media tone moderates the impact of press release tone on the market reaction to the news in the firm's press release, consistent with our predictions in hypothesis H2b.[14,15] Therefore, we conclude that the role of corporate press release tone is weaker when abnormal media tone is higher. In other words, press release tone matters less to market participants when the tone of new information generated by the media is more positive. Overall, our findings are consistent with the abnormal media tone being informative itself and a significant driver of the market response to the news in the firm's press release. An alternative, non-mutually exclusive explanation is that the abnormal media tone may just be reflective of the news in the press release and other economic news entering the market price on that day. A combination of both explanations is also possible.

[14] If we mean-centre $PRTone_{AVG}$ and $MARESID_{AVG}$ (i.e., subtract the means from the values of the original variables so that they have a mean of 0), our results (untabulated) remain unchanged to those reported in Tables 5 and 6 (Dawson 2014).

[15] The coefficient for the interaction term is also significantly negative when controlling for industry fixed effects (untabulated). Specifically, under a pooled OLS regression model specification, the coefficient for $PRTone_{AVG}$ is 0.695 (t-statistic = 9.42), while the coefficients for $MARESID_{AVG}$ and $PRTone_{AVG}$ * $MARESID_{AVG}$ are 1.860 (t-statistic = 17.62) and −0.586 (t-statistic = −2.73), respectively.

In columns 3 and 4, we estimate equation (8b) for above-median (i.e., $PRDummy_{AVG}$ = 1) and below-median ($PRDummy_{AVG}$ = 0) press release tone subsamples, respectively. Although our findings are similar to the ones reported for the full-sample, we observe that the coefficient for the interaction term $PRTone_{AVG} * MARESID_{AVG}$ is only statistically significant for the above-median press release tone subsample, suggesting that the media's moderating effect exists only for considerably favourable corporate disclosures.

To measure the incremental market response to managers' and financial journalists' language, we have collected data on and incorporated a range of control variables into the regressions in columns 1-4 in order to more cleanly isolate the informativeness of our tone measures to the market. The control variables that are known to have information content are analyst coverage (*ANALYST*), idiosyncratic volatility (*VOLAT*), firm size (*SIZE*), book-to-market ratio (*BTM*), leverage (*LEV*), share turnover (*SHTURN*), level of media coverage (*MACOUNT*), and an indicator variable that takes the value one if earnings per share are negative, and zero otherwise (*LOSS*). Consistent with existing literature, the coefficients on *SIZE* and *LOSS* are negative and significant at the 1% level, and the coefficients on *VOLAT* and *BTM* are positive and broadly statistically significant.

In contrast to prior literature that examines the market reactions to the tone of management- and media-issued content independently, we find that the financial press plays a significant role in the information transmission process after controlling for firm disclosures, and hence offer direct evidence about the value of original press-issued information to market participants. Our results in Table 6 are consistent with H2a and H2b; thus, they contribute to the literature that examines the role of the media in financial markets by presenting evidence that supports its informative and moderating role.

[Insert Table 6 here]

To visually examine this relation, Figure 1 displays the association between abnormal returns and corporate press release tone at different levels of abnormal media tone, that is, the

minimum, 25th percentile (i.e., Q1), median, 75th percentile (i.e., Q3), and maximum of the distribution of $MARESID_{AVG}$. In line with the previously reported findings, Figure 1 illustrates the moderating role of the financial media. In particular, we observe that abnormal media tone moderates the positive effect of press release tone on market reactions. The slope of the association between $PRTone_{AVG}$ and *ABRET (%)* becomes flatter as $MARESID_{AVG}$ increases. It is worth noting that negative abnormal media tone (e.g., the minimum or Q1 of the distribution of $MARESID_{AVG}$) is associated with negative abnormal market reactions across all or almost all values of $PRTone_{AVG}$. This finding is in line with prior research, suggesting that the market deems news stories in the business press as more credible than firms' communications with the investment community (Kothari et al. 2009a). We also observe that the combination of highly negative (positive) corporate press release tone and highly negative (positive) abnormal media tone is associated with the highest negative (positive) abnormal market returns. In particular, *ABRET (%)* takes its lowest (highest) value, that is, −2.63% (1.85%), when $PRTone_{AVG}$ and $MARESID_{AVG}$ are at their lowest (highest) values. Therefore, we extend the findings by Kothari et al. (2009b) of a general asymmetry in the market's reaction to managers' disclosure of positive and negative news, by showing that there is a similar asymmetric effect, with market participants reacting more (in magnitude) to highly negative news disclosed by the firm when it is accompanied by highly negative abnormal media tone compared to overly positive news announced by the firm when it is accompanied by overly positive abnormal media tone.

[Insert Figure 1 here]

4.4 Robustness and Supplemental Tests

4.4.1 The Relation Between Media Article Tone and Corporate Press Release Tone: Earnings vs. Non-earnings Announcements

We perform several robustness tests to examine the association between $MATone_{AVG}$ and $PRTone_{AVG}$, and the informativeness of both tone measures to market participants. First, the results described previously are based on tone measures calculated using both firm earnings and

non-earnings release announcements, and related articles in the financial press. Given the prominence of earnings announcements in our sample, in Tables 7 and 8 we distinguish between earnings and other (non-earnings) announcements; this allows us to examine whether, and to what extent, the financial press attenuates the tone of both types of disclosures, and also to test for differences in the association between the market reaction and abnormal media tone for the two types of disclosures.

In Table 7 we examine earnings and non-earnings announcements separately (Panels A and B, respectively), and investigate the robustness of the results presented in Table 5. The vast majority of corporate press releases in the sample are earnings release announcements, which are highly anticipated and scrutinised disclosures. In contrast, about 30% of the corporate press releases in the sample are not related to earnings. These announcements are more prone to strategic reporting by managers (Segal and Segal, 2016). Consistent with our primary results, we find that there is a significant positive association between press release and media article tone both for earnings and non-earnings announcements. We also present evidence that the financial press attenuates the tone of both types of firm disclosures; this effect is asymmetric for both types, with the press mostly downplaying the tone of highly positive earnings and non-earnings announcements; this further indicates that financial journalists consider management's favourable disclosures as less convincing. However, we observe that this effect is more pronounced for non-earnings disclosures relative to earnings announcements. This is intuitive and consistent with the monitoring role of the financial press given the evidence by Segal and Segal (2016) on managers' tendency for strategic reporting in these announcements.

[Insert Table 7 here]

4.4.2 The Relation between Abnormal Returns and Tone: Earnings vs. Non-earnings Announcements

In Table 8, we investigate whether the market reaction to firm news correlates differently with press-generated and management-issued earnings (Panel A) and non-earnings (Panel B) related

textual content. In the analysis of the impact of abnormal media tone and press release tone on abnormal returns for the subset of earnings announcements, we can now control for the underlying earnings news contained in the earnings announcements. In other words, apart from controlling for the 'soft' information contained in the press releases (i.e., tone) as well as various firm characteristics, we now also control for the 'hard' (i.e., quantitative) information by including the variable *EARNSURP* (i.e., earnings surprise) in our regressions when examining earnings release announcements. *EARNSURP* is defined as: actual earnings per share minus analyst consensus (median) earnings forecast, both as reported by I/B/E/S, divided by stock price at the beginning of the quarter.[16] Similar to our primary results, we show that the abnormal media tone is significantly associated with the market reaction to both earnings and non-earnings announcements. Nevertheless, the coefficient for the interaction term $PRTone_{AVG} * MARESID_{AVG}$ is statistically indistinguishable from zero when examining earnings release announcements, indicating that that there is no moderating effect by the media on the relation between earnings announcement tone and market reaction. In contrast, in line with the media playing a moderating role, the above coefficient remains economically and statistically significant when examining non-earnings announcements, particularly favourable ones.

Last but not least, the distinction between earnings and non-earnings announcements in Table 8 helps towards disentangling the two alternative, non-mutually exclusive, explanations we provide for our full-sample results, namely that abnormal media tone is a driver of the market reaction to the news in the firm's press release, and/or that it reflects the economic news contained in the firm's press release. Arguably, the coefficient on *EARNSURP* in Panel A captures the impact of 'hard' earnings news contained in the earnings-related press releases on market reactions. In line with prior literature (e.g., Henry and Leone 2016), we find that the 'hard' earnings news disseminated with the earnings announcement are significantly positively

[16] In untabulated tests, we show that our results are virtually identical when defining *EARNSURP* as: (actual earnings per share − mean estimated earnings per share) / beginning share price.

associated with the market reaction to the announcement. Still, the abnormal media article tone remains highly economically and statistically significant, which appears to be consistent with the media tone being a driver of the market reaction to the news in the firm's press release. The fact that $MARESID_{AVG}$ is significant after controlling for *EARNSURP* is in line with the information creation media role driving the market reactions.[17]

Overall, our regression results on the earnings announcements subset are consistent with abnormal media tone being an important determinant of the market reaction to the news disseminated with the firm's earnings release announcement. Still, we acknowledge that we cannot rule out the alternative explanation we offer, i.e., that the abnormal media tone reflects the economic news contained in the firm's press release, for the entirety of our sample.

[Insert Table 8 here]

4.4.3 Reverse Causality

A potential concern with our conjecture that the financial media attenuates the tone of corporate press releases is that firms might disclose corporate information in response to media coverage, leading to reverse causality inferences. To investigate potential reverse causality, we obtain data on corporate disclosure and media article timings from the Factiva database. Factiva provides non-missing time stamps for more than 93% of our sample corporate disclosures and financial media articles. For each firm-day observation, we consider the time stamps of the firm announcement and the earliest related article in the financial press, and find that the corporate press release is issued before the media article about the firm for more than 85% of the observations. This indicates that reverse causality is not likely to explain our main results. As an additional robustness test, we exclude from our analysis firm-day observations, where the earliest media article about the firm is published before the corporate disclosure, and show that our

[17] We note that the inclusion of $MARESID_{AVG}$ also materially improves the explanatory power of the regressions. More specifically, excluding the variables $MARESID_{AVG}$ and the interaction term $PRTone_{AVG}$ * $MARESID_{AVG}$ from the regression in column 2 of Table 8, Panel A, results in the R^2 dropping to 0.006. The significant drop compared to the R^2 reported in the table (R^2 = 0.019) leads us to the conclusion that the inclusion of the above variables materially improves the explanatory power of the model.

inferences remain unchanged (untabulated). Still, we decide to include these observations in our primary analysis due to potential leakages of information by the firm, as financial journalists may have private information and write a news story about an upcoming announcement.

4.4.4 Alternative Tone Measures

As discussed in Section 3.1.1, prior literature in accounting and finance has used both general purpose and domain-specific dictionaries in different contexts to measure document sentiment. In the main analyses, we construct and use average tone measures based on two general (Diction and LIWC) and two financial-customised (LM and Henry) dictionaries. In this section, we examine the robustness of our findings by employing dictionary-based tone measures that are calculated from the above 'libraries' of words separately.

In untabulated analysis, we re-estimate equations (7a) and (7b) using tone measures based on each word list separately. Consistent with hypotheses H1a and H1b, all dictionaries show that there is a significant positive association between $MATone_s$ and $PRTone_s$, where *s* equals LM, Henry, Diction, or LIWC, and that the financial press attenuates the tone of firm-initiated disclosures. In line with our primary results, our findings further demonstrate that the financial press downplays the above-median tone of firm disclosures more. In fact, based on the LIWC dictionary analysis, the media completely discounts the above-median tone of firm disclosures (i.e., more favourable disclosures).

In addition, we examine the association between $PRTone_s$ as well as $MARESID_s$ and *ABRET*; similar to our findings in Table 6, the results of the alternative word lists indicate that the market reaction to the underlying news event is associated both with the unexplained component of media articles' tone and the tone of corporate disclosures, and that $MARESID_s$ moderates the impact of $PRTone_s$ on market reactions for more favourable corporate disclosures. In summary, we find qualitatively similar results −in terms of the moderating role of the financial

press, and the informativeness of media articles' textual content to market participants− when using tone scores based on either financial domain-specific or general word lists.

Lastly, the use of double-averaged tone measures in the primary analyses, as described in Section 3.1.2, could mechanically drive the positive (but below unity) association between $MATone_{AVG}$ and $PRTone_{AVG}$ that we report in Table 5. Specifically, one could argue that our finding about the media attenuating the tone of corporate press releases is merely because our main measure of media articles' tone reflects the consensus tone among financial journalists, since we use the average tone of all media articles published about the company on trading day *t*. To rule out this alternative explanation, when there are more than one media articles issued about firm *q* on trading day *t*, we consider only the earliest media article about the firm, and ignore all subsequent articles issued later during the day. We also do the same in the rare case of having multiple press releases issued by the firm in the same trading day. Untabulated results show that our primary results are unaffected by this sensitivity analysis both when using average tone measures based on LM, Henry, Diction and LIWC, and when using each of the above dictionaries separately, suggesting that our finding is not driven by the use of averages in tone scores.

4.4.5 Propensity Score Matching Test

In our analysis, we investigate the association between corporate disclosures' and related financial media articles' tone scores, and find that journalists publish articles that reflect but also attenuate the tone of firm announcements. However, it is plausible that the positive association between $MATone_{AVG}$ and $PRTone_{AVG}$ simply reflects some confounding factors that determine both media article and press release tone, and does not demonstrate causality. In Table 9, we group firms on the basis of whether their disclosures were overly positive or highly negative using $HIGHPRTone_{AVG}$, which is an indicator variable that equals 1 for the top decile of the distribution of $PRTone_{AVG}$, and 0 for the bottom decile of the distribution of $PRTone_{AVG}$. Panel

A compares the results on media article tone scores across the two groups. The univariate statistics indicate that the mean and median $MATone_{AVG}$ of firms that issued very positive corporate disclosures are significantly higher ($p < 0.01$) than those of firms that made very negative disclosures. This finding is in line with our primary results, and consistent with the idea that there is a positive association between the tone of management- and media-issued content.

However, in Panel B, we present evidence that factors other than media article tone differ significantly across the two groups, including analyst coverage (*ANALYST*), idiosyncratic volatility (*VOLAT*), firm size (*SIZE*), book-to-market ratio (*BTM*), leverage (*LEV*), and share turnover (*SHTURN*). This raises concerns over the impact of these observable differences to our conclusions. To address the possibility that confounding factors might drive our main results, and to more clearly attribute observed differences in $MATone_{AVG}$ to $PRTone_{AVG}$ itself, rather than to firm characteristics associated with firms' disclosure tone, we employ a propensity score matching design (PSM). The intuition behind PSM is simple; we match observations from two groups ($HIGHPRTone_{AVG} = 1$, and $HIGHPRTone_{AVG} = 0$) on several dimensions using the estimated likelihood of receiving *treatment* (Shipman et al. 2017). Thus, we alleviate endogeneity concerns related to selection on observable characteristics. In addition, PSM has the advantage that it relaxes assumptions about the functional form of variable relations, and hence it reduces bias from functional form misspecification (Shipman et al. 2017).

To implement this approach, we first fit a probit model in which the dependent variable is $HIGHPRTone_{AVG}$ (untabulated). The regressors include *ANALYST*, *VOLAT*, *SIZE*, *BTM*, *LEV*, *SHTURN*, and day of the week, month, year, and industry fixed effects. We then derive the propensity scores based on the above characteristics, and match (without replacement) each firm from the top decile of the distribution of $PRTone_{AVG}$ with another firm, in the same year and industry, from the bottom decile of the distribution of $PRTone_{AVG}$ that has the closest propensity score within a maximum distance of 1 percent. In other words, we use a nearest-neighbour matching approach with common support and a caliper constraint of 0.01. The final sample

includes 321 matched pairs. To ensure that these firms are similar across all observable dimensions except for the disclosure tone, we present, in Panel C, the covariate differences using the matched sample. There are no longer significant differences in the means and medians of any of the covariates across the two groups; this indicates proper covariate balance. In Panel D of Table 9, we compare the results on $MATone_{AVG}$ across the two groups based on $HIGHPRTone_{AVG}$, subsequent to propensity score matching. Paired t-tests and Wilcoxon matched pairs signed-rank tests lead us to the conclusion that the mean and median $MATone_{AVG}$ of firms from the $HIGHPRTone_{AVG} = 1$ group remain significantly higher ($p < 0.01$) than those of firms from the $HIGHPRTone_{AVG} = 0$ group, suggesting a significant positive association between financial media article and corporate disclosure tone scores, a finding that is consistent with our main findings for H1a and H1b. Importantly, in Panel E, we re-estimate equations (7a) and (7b) using the matched sample, and find that our inferences remain the same; this indicates that our findings are unlikely to be driven by confounding effects.

[Insert Table 9 here]

5. Discussion and Conclusions

In this paper, we examine whether the financial press serves a monitoring role around corporate announcements. Using textual analysis, we explore the association between corporate disclosure and financial media article tone, and find support for the idea that the press not only disseminates corporate information but also interprets the tone of corporate disclosures by attenuating both the positive and negative tone of corporate press releases. Additionally, we show that the media downplays the tone of overly favourable disclosures to a greater extent, which serves as an indication that financial journalists view management disclosures containing highly positive tone with more scepticism compared to negative news announcements.

An alternative explanation to the above findings is that corporate press releases could systematically contain a mixture of stale and new information, while financial media articles are primarily focused on new information. If the tone of new information is systematically more

neutral relative to the tone of stale information, this would result in the appearance of an attenuation effect, when the correct conclusion should be that media articles focus on the new information in the corporate press releases. However, we have no reason to expect a priori the new content in the press releases to be systematically more neutral in tone than the stale content.

We also find that the market reaction to the underlying event or information released at the time the company press release is issued is associated with the tone of new information generated by financial media articles after controlling for the tone of the content of firm-initiated disclosures. This suggests that the tone of new information produced by the media either is a driver of market reactions or reflects the news included in the press release and other economic news influencing the market price on that day, or both. An alternative interpretation of the above finding is that the market could be unwinding the (positive or negative) bias in corporate disclosures and the media articles respond to the market reaction instead of informing the market reaction. Furthermore, consistent with the idea that the media sensationalises news stories, the financial media could be negatively biasing corporate disclosures, with market participants reacting to this sensational negative news in the short-run. Although we acknowledge the above alternative explanations of our findings, we argue that they do not explain the entirety of our results. For example, in Section 4.4.2, we provide evidence in line with abnormal media tone being a driver of the market reaction to the news in the firm's press release for a subset of our sample, thus, refuting the first alternative explanation. Moreover, in Table 5, we find that the media attenuates not only the positive but also the negative tone of corporate press releases, which is not consistent with the second alternative explanation based on the sensationalist view of the media.

Overall, our findings add new evidence to a growing body of literature suggesting that the tone of press-originated articles contains incremental information content. Yet, our results may not be generalisable to the population of firms, as we examine large S&P 500 firms with a rich information environment. Future research could extend our findings to test for the

importance of the media in disseminating and analysing corporate press releases issued by firms with a different information environment (i.e., small or mid-sized firms). Future studies could also investigate the information creation and dissemination roles of the media by exploring whether greater media coverage or divergence in tone between corporate disclosures and financial media articles deters managers from using inflated tone in future press releases. In addition, taking into consideration recent advances in information technology, future research should seek to better understand alternative channels through which firms disseminate information to market participants. We view two particular issues as deserving of attention. First, future work should investigate whether investors' preferences about how they receive information change over time, and whether the effects of information dissemination vary across different channels. Second, and relatedly, we would like to understand how the financial press interacts with other mechanisms, such as social media services, which also transmit firm news to investors.

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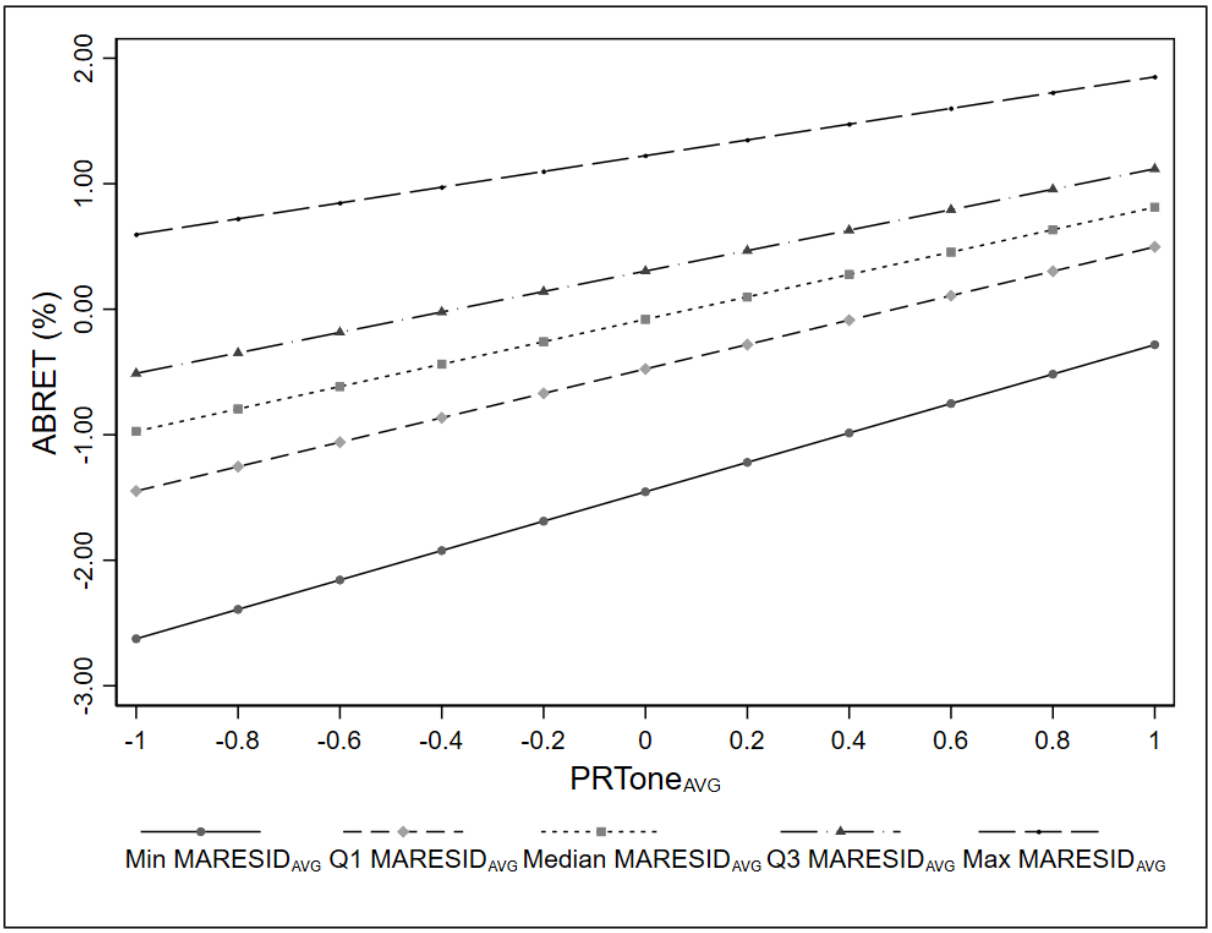
Figure 1
The Relation between Abnormal Returns and Corporate Press Release Tone
at Different Levels of Abnormal Media Tone



Notes: Figure 1 displays the relation between abnormal returns and corporate press release tone at different levels of abnormal media tone. *ABRET (%)* is the percentage abnormal returns on trading day *t*, measured as the difference between firm *q*'s stock returns and the returns on the S&P 500 index on media article and corporate disclosure day *t*, multiplied by 100. $PRTone_{AVG}$ is the average of $PRTone_{LM}$, $PRTone_{Henry}$, $PRTone_{Diction}$ and $PRTone_{LIWC}$ on trading day *t*. $MARESID_{AVG}$ is abnormal media tone, measured as the regression residuals of equation (7a). Q1 and Q3 are the 25th and 75th percentiles of $MARESID_{AVG}$, respectively. All variables are defined in Table 1.

Table 1
Variable Definitions

Variable	Definition and Measurement
$ABRET\ (\%)_{q,t}$	Firm *q's* percentage abnormal returns on trading day *t*, measured as the difference between the firm's stock returns and the returns on the S&P 500 index on media article and corporate disclosure day *t*, multiplied by 100 (Source: CRSP);
$ANALYST_{q,t}$	The number of analysts covering firm *q* as of the previous calendar quarter (Source: I/B/E/S);
$BTM_{q,t}$	Firm *q's* ratio of total assets to (total assets – book equity + market equity) as of the previous calendar quarter (Source: Compustat);
$EARNSURP_{q,t}$	Firm *q's* actual earnings per share minus analyst consensus earnings forecast scaled by stock price at the beginning of the quarter (Source: I/B/E/S, CRSP);
$HIGHPRTone_{AVG}$	Indicator variable that takes the value 1 for the top decile of the distribution of $PRTone_{AVG}$, and 0 for the bottom decile of the distribution of $PRTone_{AVG}$;
$LEV_{q,t}$	Firm *q's* ratio of long- and short-term debt to total assets as of the previous calendar quarter (Source: Compustat);
$LOSS_{q,t}$	Indicator variable that takes the value 1 if firm *q's* earnings per share are negative, and 0 otherwise (Source: Compustat);
$MACOUNT_{q,t}$	The number of media articles about firm *q's* financial performance issued on trading day *t* (Source: Factiva);
$MADummy_{AVG}$	Indicator variable that takes the value 1 if $MATone_{AVG}$ is greater than its median value (by year-quarter) in the sample, and 0 otherwise;
$MARESID_{AVG}$	Abnormal media tone, measured as the regression residuals of equation (7a);
$MATone_{AVG}$	The average of $MATone_{LM}$, $MATone_{Henry}$, $MATone_{Diction}$ and $MATone_{LIWC}$ on trading day *t*;
$MATone_{Diction}$	(OPTIMISTIC – PESSIMISTIC) / (OPTIMISTIC + PESSIMISTIC), where OPTIMISTIC and PESSIMISTIC refer to the word count frequency in media article *i* issued on trading day *t* based on the optimistic (praise, satisfaction, and inspiration) and pessimistic (blame, hardship, and denial) words in the Diction 7.0 word list, respectively (Source: Factiva);
$MATone_{Henry}$	(POSITIVE – NEGATIVE) / (POSITIVE + NEGATIVE), where POSITIVE and NEGATIVE refer to the word count frequency in media article *i* issued on trading day *t* based on the positive and negative words in the Henry (2008) word list, respectively (Source: Factiva);
$MATone_{LIWC}$	(POSITIVE – NEGATIVE) / (POSITIVE + NEGATIVE), where POSITIVE and NEGATIVE refer to the word count frequency in media article *i* issued on trading day *t* based on the positive emotion and negative emotion words in the LIWC 2015 word list, respectively (Source: Factiva);
$MATone_{LM}$	(POSITIVE – NEGATIVE) / (POSITIVE + NEGATIVE), where POSITIVE and NEGATIVE refer to the word count frequency in media article *i* issued on trading day *t* based on the positive and negative words in the Loughran and McDonald (2011b) word list, respectively (Source: Factiva);
$PRDummy_{AVG}$	Indicator variable that takes the value 1 if $PRTone_{AVG}$ is greater than its median value (by year-quarter) in the sample, and 0 otherwise;

(continued on next page)

Table 1 (continued)

Variable	Definition and Measurement
$PRTone_{AVG}$	The average of $PRTone_{LM}$, $PRTone_{Henry}$, $PRTone_{Diction}$ and $PRTone_{LIWC}$ on trading day *t*;
$PRTone_{Diction}$	(OPTIMISTIC – PESSIMISTIC) / (OPTIMISTIC + PESSIMISTIC), where OPTIMISTIC and PESSIMISTIC refer to the word count frequency in press release *j* issued on trading day *t* based on the optimistic (praise, satisfaction, and inspiration) and pessimistic (blame, hardship, and denial) words in the Diction 7.0 word list, respectively (Source: Factiva);
$PRTone_{Henry}$	(POSITIVE – NEGATIVE) / (POSITIVE + NEGATIVE), where POSITIVE and NEGATIVE refer to the word count frequency in press release *j* issued on trading day *t* based on the positive and negative words in the Henry (2008) word list, respectively (Source: Factiva);
$PRTone_{LIWC}$	(POSITIVE – NEGATIVE) / (POSITIVE + NEGATIVE), where POSITIVE and NEGATIVE refer to the word count frequency in press release *j* issued on trading day *t* based on the positive emotion and negative emotion words in the LIWC 2015 word list, respectively (Source: Factiva);
$PRTone_{LM}$	(POSITIVE – NEGATIVE) / (POSITIVE + NEGATIVE), where POSITIVE and NEGATIVE refer to the word count frequency in press release *j* issued on trading day *t* based on the positive and negative words in the Loughran and McDonald (2011b) word list, respectively (Source: Factiva);
$SHTURN_{q,t}$	Firm *q*'s ratio of the total number of shares traded to the total number of shares outstanding as of the previous calendar quarter (Source: Compustat);
$SIZE_{q,t}$	The natural logarithm of firm *q*'s market value of equity as of the previous calendar quarter (Source: Compustat); and
$VOLAT_{q,t}$	The natural logarithm of the standard deviation of firm *q*'s *ABRET* in the last 90 trading days relative to trading day *t* (Source: CRSP).

Table 2
Counts of Media Articles and Press Releases by Calendar Period

Number of Media Articles and Press Releases per Day of the Week

	Monday	Tuesday	Wednesday	Thursday	Friday	Total
Media Articles	7,505	18,341	17,471	24,206	6,761	74,284
Press Releases	2,931	6,483	6,605	8,881	2,381	27,281

Number of Media Articles and Press Releases per Month of Publication

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Media Articles	10,057	6,874	2,815	10,745	4,478	2,334	10,848	4,527	2,440	11,252	5,143	2,771	74,284
Press Releases	3,457	2,670	1,070	3,967	1,680	861	3,960	1,621	946	4,179	1,806	1,064	27,281

Number of Media Articles and Press Releases per Year of Publication

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Media Articles	994	3,950	5,426	4,782	7,087	7,344	5,140	4,908	4,941	5,593	6,087	5,177	7,316	5,539	74,284
Press Releases	474	1,765	2,020	2,018	2,526	2,642	2,042	2,075	2,234	2,155	1,826	1,734	2,069	1,701	27,281

Notes: The table presents counts of media articles and press releases by day, month and year of publication. Our sample includes 74,284 media articles and 27,281 press releases related to companies' financial performance from the Factiva database for the Standard and Poor's 500 index constituent firms over the period January 2000 – December 2013. All variables are defined in Table 1.

Table 3
Descriptive Statistics

Panel A: Descriptive Statistics for the Regression Sample						
	Obs.	Mean	Std. Dev.	Q1	Median	Q3
$MATone_{AVG}$	24,535	0.185	0.332	−0.053	0.186	0.425
$PRTone_{AVG}$	24,535	0.263	0.281	0.074	0.252	0.443
$MARESID_{AVG}$	24,535	0.000	0.293	−0.198	0.004	0.200
ANALYST	24,535	18.166	7.852	13.000	18.000	23.000
Idiosyncratic Volatility	24,535	0.019	0.013	0.011	0.016	0.023
Market Capitalisation (in millions)	24,535	27,731	49,910	4,920	10,479	25,542
BTM	24,535	0.650	0.270	0.432	0.638	0.878
LEV	24,535	0.245	0.168	0.121	0.233	0.343
SHTURN	24,535	0.654	0.530	0.316	0.492	0.799
ABRET (%)	24,535	0.148	3.267	−1.644	0.063	1.944
MACOUNT	24,535	3.028	2.893	1.000	2.000	4.000
LOSS	24,535	0.114	0.317	0.000	0.000	0.000
EARNSURP (%)	17,061	−0.018	3.177	0.000	0.048	0.154

Panel B: Descriptive Statistics for the Alternative Tone Measures						
	Obs.	Mean	Std. Dev.	Q1	Median	Q3
$MATone_{LM}$	24,535	−0.193	0.461	−0.534	−0.222	0.100
$MATone_{Henry}$	24,535	0.348	0.404	0.077	0.400	0.656
$MATone_{Diction}$	24,535	0.086	0.486	−0.250	0.085	0.429
$MATone_{LIWC}$	24,535	0.501	0.308	0.302	0.529	0.733
$PRTone_{LM}$	24,535	−0.022	0.433	−0.329	−0.059	0.231
$PRTone_{Henry}$	24,535	0.448	0.321	0.255	0.484	0.667
$PRTone_{Diction}$	24,535	0.144	0.394	−0.111	0.135	0.406
$PRTone_{LIWC}$	24,535	0.483	0.270	0.318	0.490	0.647

Notes: The table describes characteristics of firms in our sample. Panels A and B report descriptive statistics for the raw values of key variables, and for the alternative tone measures, respectively. *BTM*, *LEV* and *SHTURN* are winsorised at 99%. *ABRET* and *EARNSURP* are winsorised at 1% and 99%. The sample size for each variable is 24,535 firm-day observations (*EARNSURP* has 17,061 firm-day observations); Q1 is the 25th percentile; Q3 is the 75th percentile. All variables are defined in Table 1.

Table 4
Correlation Matrix for the Regression Sample

		1	2	3	4	5	6	7	8	9	10	11	12
1	$MATone_{AVG}$	1.000											
2	$PRTone_{AVG}$	0.364***	1.000										
3	ANALYST	0.002	−0.001	1.000									
4	VOLAT	−0.282***	−0.170***	−0.055***	1.000								
5	SIZE	0.102***	0.188***	0.513***	−0.377***	1.000							
6	BTM	−0.228***	−0.166***	−0.176***	0.073***	−0.204***	1.000						
7	LEV	−0.048***	0.019***	−0.222***	−0.005	−0.061***	0.249***	1.000					
8	SHTURN	−0.167***	−0.178***	0.137***	0.542***	−0.291***	0.053***	−0.033***	1.000				
9	ABRET	0.146***	0.051***	−0.013**	0.017***	−0.012*	0.002	−0.005	0.006	1.000			
10	MACOUNT	0.022***	0.005	0.212***	−0.125***	0.351***	−0.024***	0.020***	−0.045***	−0.008	1.000		
11	LOSS	−0.255***	−0.187***	−0.059***	0.346***	−0.215***	0.224***	0.089***	0.251***	−0.045***	−0.062***	1.000	
12	EARNSURP	0.054***	0.041***	0.024***	−0.116***	0.048***	−0.034***	−0.037***	−0.061***	0.045***	0.009	−0.080***	1.000

Notes: The table presents Pearson correlation coefficients. *BTM*, *LEV* and *SHTURN* are winsorised at 99%. *ABRET* and *EARNSURP* are winsorised at 1% and 99%. The sample size for each variable is 24,535 firm-day observations (*EARNSURP* has 17,061 firm-day observations). The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance. All variables are defined in Table 1.

Table 5

The Relation between Media Article Tone and Corporate Press Release Tone

Dependent Variable: $MATone_{AVG}$	(1)	(2)	(3)	(4)
$PRTone_{AVG}$	0.395***	0.362***	0.514***	0.469***
	(24.06)	(23.56)	(19.66)	(19.43)
$PRDummy_{AVG}$			0.128***	0.111***
			(9.97)	(8.90)
$PRTone_{AVG}$ * $PRDummy_{AVG}$			−0.324***	−0.283***
			(−8.51)	(−7.75)
ANALYST		−0.002***		−0.002***
		(−2.79)		(−2.60)
VOLAT		−0.101***		−0.099***
		(−12.15)		(−11.98)
SIZE		−0.001		−0.005
		(−0.17)		(−0.61)
BTM		−0.337***		−0.332***
		(−13.42)		(−13.14)
LEV		−0.040		−0.043
		(−1.21)		(−1.32)
SHTURN		0.004		0.006
		(0.50)		(0.74)
Intercept	0.061***	−0.039	0.048**	−0.017
	(2.95)	(−0.48)	(2.34)	(−0.21)
Firm FE	Yes	Yes	Yes	Yes
Year, Month, Day of Week FE	Yes	Yes	Yes	Yes
R^2	0.197	0.228	0.210	0.237
Observations	24,535	24,535	24,535	24,535

Notes: The table presents regression results on the relation between media article tone and corporate press release tone. The dependent variable, $MATone_{AVG}$, is the average of $MATone_{LM}$, $MATone_{Henry}$, $MATone_{Diction}$, and $MATone_{LIWC}$ on trading day *t*. All remaining variables are defined in Table 1. Firm, year, month, and day of the week fixed effects are included in all regressions (coefficients not reported). *BTM*, *LEV* and *SHTURN* are winsorised at 99%. The t-statistics are in parentheses. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance. All standard errors are clustered at firm level.

Table 6
The Relation between Abnormal Returns and Tone

Dependent Variable: ABRET (%)	(1)	(2)	(3)	(4)
			$PRDummy_{AVG}=1$	$PRDummy_{AVG}=0$
$PRTone_{AVG}$	0.926***	0.900***	0.866***	0.836***
	(10.47)	(10.14)	(5.49)	(3.54)
$MARESID_{AVG}$	1.812***	1.927***	2.445***	1.868***
	(21.13)	(17.71)	(8.77)	(15.40)
$PRTone_{AVG}$ * $MARESID_{AVG}$		−0.406*	−1.381***	−0.369
		(−1.87)	(−3.08)	(−0.69)
ANALYST	−0.012*	−0.012*	−0.011	−0.010
	(−1.90)	(−1.92)	(−1.29)	(−1.12)
VOLAT	0.210**	0.205**	0.467***	0.090
	(2.20)	(2.16)	(3.35)	(0.65)
SIZE	−0.404***	−0.403***	−0.453***	−0.374***
	(−5.17)	(−5.16)	(−3.83)	(−3.24)
BTM	0.416*	0.408*	0.749**	0.344
	(1.69)	(1.66)	(2.17)	(0.96)
LEV	−0.130	−0.134	0.097	−0.202
	(−0.41)	(−0.42)	(0.21)	(−0.44)
SHTURN	−0.095	−0.095	−0.358**	0.059
	(−0.86)	(−0.86)	(−2.10)	(0.42)
MACOUNT	−0.007	−0.007	0.023**	−0.035***
	(−0.96)	(−0.88)	(2.27)	(−2.71)
LOSS	−0.430***	−0.429***	−0.513***	−0.419***
	(−4.53)	(−4.51)	(−3.42)	(−3.46)
Intercept	4.295***	4.294***	5.809***	3.459***
	(4.90)	(4.90)	(4.33)	(2.70)
Firm FE	Yes	Yes	Yes	Yes
Year, Month, Day of Week FE	Yes	Yes	Yes	Yes
R^2	0.019	0.020	0.018	0.022
Observations	24,535	24,535	12,251	12,284

Notes: The table presents regression results on the relation between abnormal returns and tone. The dependent variable, *ABRET (%)*, is the percentage abnormal returns on trading day *t*, measured as the difference between firm *q's* stock returns and the returns on the S&P 500 index on media article and corporate disclosure day *t*, multiplied by 100. All remaining variables are defined in Table 1. Firm, year, month, and day of the week fixed effects are included in all

regressions (coefficients not reported). *BTM*, *LEV* and *SHTURN* are winsorised at 99%. *ABRET* is winsorised at 1% and 99%. The t-statistics are in parentheses. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance. All standard errors are clustered at firm level.

Table 7

The Relation between Media Article Tone and Corporate Press Release Tone: Earnings and Non-earnings Announcements

	Panel A: Earnings Announcements				Panel B: Non-earnings Announcements			
Dependent Variable: $MATone_{AVG}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$PRTone_{AVG}$	0.638***	0.573***	0.698***	0.615***	0.300***	0.289***	0.346***	0.341***
	(32.04)	(29.38)	(24.43)	(21.89)	(16.27)	(16.39)	(10.12)	(10.34)
$PRDummy_{AVG}$			0.050***	0.038**			0.092***	0.086***
			(3.09)	(2.52)			(4.58)	(4.26)
$PRTone_{AVG}$ * $PRDummy_{AVG}$			−0.159***	−0.117***			−0.174***	−0.173***
			(−3.39)	(−2.61)			(−3.51)	(−3.53)
ANALYST		−0.002**		−0.002**		−0.001		−0.001
		(−2.41)		(−2.41)		(−1.14)		(−1.00)
VOLAT		−0.087***		−0.086***		−0.111***		−0.111***
		(−9.47)		(−9.39)		(−7.46)		(−7.45)
SIZE		−0.006		−0.008		−0.017		−0.016
		(−0.78)		(−0.95)		(−1.25)		(−1.20)
BTM		−0.323***		−0.324***		−0.281***		−0.275***
		(−11.98)		(−12.02)		(−6.39)		(−6.22)
LEV		−0.020		−0.022		−0.047		−0.054
		(−0.59)		(−0.63)		(−0.83)		(−0.97)
SHTURN		0.000		0.001		0.002		0.004
		(0.03)		(0.13)		(0.13)		(0.23)
Intercept	0.010	0.002	0.007	0.017	0.013	−0.010	0.005	−0.029
	(0.42)	(0.02)	(0.30)	(0.19)	(0.37)	(−0.07)	(0.13)	(−0.20)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year, Month, Day of Week FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.267	0.285	0.269	0.287	0.141	0.175	0.147	0.178
Observations	17,061	17,061	17,061	17,061	7,474	7,474	7,474	7,474

Notes: The table presents regression results on the relation between media article tone and corporate press release tone for the earnings and non-earnings announcement subsamples (Panels A and B, respectively). The dependent variable in both Panels, $MATone_{AVG}$, is the average of $MATone_{LM}$, $MATone_{Henry}$, $MATone_{Diction}$, and $MATone_{LIWC}$ on trading day *t*. All remaining variables are defined in Table 1. Firm, year, month, and day of the week fixed effects are included in all regressions (coefficients not reported). *BTM*, *LEV* and *SHTURN* are winsorised at 99%. The t-statistics are in parentheses. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance. All standard errors are clustered at firm level.

Table 8

The Relation between Abnormal Returns and Tone: Earnings and Non-earnings Announcements

	Panel A: Earnings Announcements				Panel B: Non-earnings Announcements			
Dependent Variable: ABRET (%)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			$PRDummy_{AVG}=1$	$PRDummy_{AVG}=0$			$PRDummy_{AVG}=1$	$PRDummy_{AVG}=0$
$PRTone_{AVG}$	1.075***	1.087***	1.358***	1.330***	1.040***	1.015***	0.550*	0.897***
	(6.77)	(6.85)	(4.06)	(3.85)	(8.86)	(8.57)	(1.87)	(3.01)
$MARESID_{AVG}$	1.899***	1.818***	1.863***	1.886***	1.612***	1.820***	2.244***	1.789***
	(17.01)	(11.68)	(3.72)	(11.19)	(12.95)	(11.11)	(4.60)	(9.90)
$PRTone_{AVG}$ * $MARESID_{AVG}$		0.342	0.285	−0.867		−0.620**	−1.525**	0.090
		(0.82)	(0.28)	(−0.90)		(−2.20)	(−2.21)	(0.13)
ANALYST	−0.007	−0.007	0.004	−0.009	−0.018	−0.018	−0.008	−0.024
	(−0.86)	(−0.87)	(0.32)	(−0.86)	(−1.38)	(−1.42)	(−0.51)	(−1.25)
VOLAT	0.332***	0.334***	0.555***	0.275*	0.182	0.175	0.595**	−0.179
	(2.82)	(2.84)	(3.05)	(1.68)	(1.04)	(1.00)	(2.54)	(−0.67)
SIZE	−0.556***	−0.555***	−0.879***	−0.429***	−0.308*	−0.305*	−0.046	−0.484*
	(−6.49)	(−6.49)	(−6.32)	(−3.38)	(−1.76)	(−1.74)	(−0.21)	(−1.79)
BTM	0.544*	0.547*	0.549	0.626	−0.387	−0.392	0.527	−1.028
	(1.78)	(1.79)	(1.20)	(1.51)	(−0.90)	(−0.91)	(0.87)	(−1.58)
LEV	−0.209	−0.211	−0.593	−0.126	0.192	0.173	0.622	0.038
	(−0.53)	(−0.53)	(−1.08)	(−0.22)	(0.32)	(0.29)	(0.77)	(0.05)
SHTURN	−0.058	−0.057	−0.253	0.065	−0.239	−0.235	−0.542**	0.174
	(−0.43)	(−0.42)	(−1.09)	(0.38)	(−1.20)	(−1.18)	(−2.34)	(0.56)
MACOUNT	0.002	0.002	0.019	−0.015	−0.007	−0.007	0.072***	−0.070**
	(0.21)	(0.20)	(1.36)	(−0.92)	(−0.39)	(−0.36)	(2.91)	(−2.41)
LOSS	−0.292**	−0.291**	−0.500**	−0.239*	−0.622***	−0.619***	−0.725***	−0.595***
	(−2.48)	(−2.48)	(−2.12)	(−1.70)	(−3.92)	(−3.89)	(−3.23)	(−2.67)
EARNSURP	5.976**	5.947**	6.162	5.598*				
	(2.14)	(2.13)	(1.26)	(1.71)				
Intercept	6.235***	6.240***	10.021***	4.723***	3.369*	3.331*	2.262	3.909
	(6.39)	(6.40)	(6.09)	(3.30)	(1.82)	(1.80)	(0.89)	(1.45)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year, Month, Day of Week FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.019	0.019	0.017	0.023	0.033	0.035	0.031	0.032
Observations	17,061	17,061	8,515	8,546	7,474	7,474	3,717	3,757

Notes: The table presents regression results on the relation between abnormal returns and tone for the earnings and non-earnings announcement subsamples (Panels A and B, respectively). The dependent variable in both Panels, *ABRET (%)*, is the percentage abnormal returns on trading day *t*, measured as the difference between firm *q's* stock returns and the returns on the S&P 500 index on media article and corporate disclosure day *t*, multiplied by 100. All remaining variables are defined in Table 1. Firm, year, month, and day of the week fixed effects are included in all regressions (coefficients not reported). *BTM*, *LEV* and *SHTURN* are winsorised at 99%. *ABRET* and *EARNSURP* are winsorised at 1% and 99%. The t-statistics are in parentheses. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance. All standard errors are clustered at firm level.

Table 9

Comparison between Firms with High $PRTone_{AVG}$ and Firms with Low $PRTone_{AVG}$

Panel A: Prior to propensity score matching, differences in $MATone_{AVG}$ across groups based on $HIGHPRTone_{AVG}$

	$HIGHPRTone_{AVG}$ = 1 (N = 2,454)			$HIGHPRTone_{AVG}$ = 0 (N = 2,454)			Standardised Differences	Differences (1 – 0)	
Variables	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	(%)	Mean	Median
$MATone_{AVG}$	0.317	0.325	0.345	−0.075	−0.108	0.306	120.45	0.393***	0.433***

Panel B: Prior to propensity score matching, differences in covariates across groups based on $HIGHPRTone_{AVG}$

	$HIGHPRTone_{AVG}$ = 1 (N =2,454)			$HIGHPRTone_{AVG}$ = 0 (N = 2,454)			Standardised Differences	Differences (1 – 0)	
Variables	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	(%)	Mean	Median
ANALYST	19.406	19.000	7.912	18.559	18.000	8.360	10.41	0.847***	1.000***
VOLAT	−4.188	−4.244	0.498	−3.872	−3.916	0.576	−58.64	−0.316***	−0.328***
SIZE	9.906	9.795	1.300	8.911	8.926	1.316	76.04	0.995***	0.869***
BTM	0.620	0.598	0.266	0.740	0.757	0.279	−44.11	−0.120***	−0.159***
LEV	0.255	0.247	0.160	0.236	0.217	0.179	11.29	0.019***	0.029***
SHTURN	0.560	0.421	0.468	0.884	0.663	0.702	−54.30	−0.324***	−0.242***

Panel C: Subsequent to propensity score matching, differences in covariates across groups based on $HIGHPRTone_{AVG}$

	$HIGHPRTone_{AVG}$ = 1 (N = 321)			$HIGHPRTone_{AVG}$ = 0 (N = 321)			Standardised Differences	Differences (1 – 0)	
Variables	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	(%)	Mean	Median
ANALYST	21.041	21.000	7.374	21.178	21.000	8.234	−1.75	−0.137	0.000
VOLAT	−4.062	−4.112	0.515	−4.062	−4.155	0.539	−0.08	−0.000	0.043
SIZE	9.531	9.508	1.107	9.487	9.465	1.062	4.07	0.044	0.043
BTM	0.672	0.685	0.260	0.648	0.630	0.284	8.98	0.024	0.055
LEV	0.217	0.195	0.159	0.215	0.172	0.190	1.10	0.002	0.024
SHTURN	0.755	0.620	0.560	0.748	0.613	0.549	1.28	0.007	0.007

Panel D: Subsequent to propensity score matching, differences in $MATone_{AVG}$ across groups based on $HIGHPRTone_{AVG}$

	$HIGHPRTone_{AVG}$ = 1 (N = 321)			$HIGHPRTone_{AVG}$ = 0 (N = 321)			Standardised Differences	Differences (1 – 0)	
Variables	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	(%)	Mean	Median
$MATone_{AVG}$	0.275	0.268	0.346	0.027	−0.009	0.334	72.89	0.248***	0.278***

Panel E: Subsequent to propensity score matching, Firm FE models estimated for $MATone_{AVG}$

Dependent Variable: $MATone_{AVG}$	(1)	(2)
$PRTone_{AVG}$	0.217***	0.860***
	(5.46)	(4.10)
$PRDummy_{AVG}$		0.159
		(0.81)
$PRTone_{AVG}$ * $PRDummy_{AVG}$		−1.044***
		(−3.78)
ANALYST	0.000	−0.001
	(0.06)	(−0.10)
VOLAT	−0.119**	−0.107**
	(−2.50)	(−2.23)
SIZE	−0.054	−0.040
	(−1.06)	(−0.77)
BTM	−0.653***	−0.647***
	(−4.00)	(−3.92)
LEV	−0.154	−0.240
	(−0.93)	(−1.43)
SHTURN	−0.054	−0.063
	(−1.29)	(−1.53)
Intercept	0.443	0.566
	(0.76)	(0.97)
Firm FE	Yes	Yes
Year, Month, Day of Week FE	Yes	Yes
R^2	0.179	0.198
Observations	642	642

Notes: **Panel A** compares the results on *MATONE$_{AVG}$* across groups based on *HIGHPRTone$_{AVG}$*. The standardised difference in percent is $100(\bar{x}_{gr1} - \bar{x}_{gr0}) / \sqrt{\frac{(s^2_{gr1} + s^2_{gr0})}{2}}$, where $\bar{x}_{gr1}$ (s^2_{gr1}) is the sample mean (variance) in the *HIGHPRTone$_{AVG}$* = 1 group and $\bar{x}_{gr0}$ (s^2_{gr0}) is the sample mean (variance) in the *HIGHPRTone$_{AVG}$* = 0 group. Standardised differences > 20 or < –20 indicate large differences (Rosenbaum and Rubin 1983, Ferri and Maber 2013, Hooghiemstra et al. 2015). Two-sample t-tests (Wilcoxon two-sample rank-sum tests) are used to test differences in means (differences in medians). The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance. All variables are defined in Table 1. **Panel B** compares the results on covariates based on *HIGHPRTone$_{AVG}$*. The standardised difference in percent is $100(\bar{x}_{gr1} - \bar{x}_{gr0}) / \sqrt{\frac{(s^2_{gr1} + s^2_{gr0})}{2}}$, where $\bar{x}_{gr1}$ (s^2_{gr1}) is the sample mean (variance) in the *HIGHPRTone$_{AVG}$* = 1 group and $\bar{x}_{gr0}$ (s^2_{gr0}) is the sample mean (variance) in the *HIGHPRTone$_{AVG}$* = 0 group. Standardised differences > 20 or < –20 suggest large differences (Rosenbaum and Rubin 1983, Ferri and Maber 2013, Hooghiemstra et al. 2015). Two-sample t-tests (Wilcoxon two-sample rank-sum tests) are used to test differences in means (differences in medians). *BTM*, *LEV* and *SHTURN* are winsorised at 99%. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance. All variables are defined in Table 1. **Panel C** compares the results on covariates based on *HIGHPRTone$_{AVG}$*, subsequent to propensity score matching. The standardised difference in percent is $100(\bar{x}_{gr1} - \bar{x}_{gr0}) / \sqrt{\frac{(s^2_{gr1} + s^2_{gr0})}{2}}$, where $\bar{x}_{gr1}$ (s^2_{gr1}) is the sample mean (variance) in the *HIGHPRTone$_{AVG}$* = 1 group and $\bar{x}_{gr0}$ (s^2_{gr0}) is the sample mean (variance) in the *HIGHPRTone$_{AVG}$* = 0 group. Standardised differences < 20 and > –20 are commonly viewed as indicating a good match (Rosenbaum and Rubin 1983, Ferri and Maber 2013, Hooghiemstra et al. 2015). Paired t-tests (Wilcoxon matched pairs signed-rank tests) are used to test differences in means (differences in medians). *BTM*, *LEV* and *SHTURN* are winsorised at 99%. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance. All variables are defined in Table 1. **Panel D** compares the results on *MATONE$_{AVG}$* across groups based on *HIGHPRTone$_{AVG}$*, subsequent to propensity score matching. The standardised difference in percent is $100(\bar{x}_{gr1} - \bar{x}_{gr0}) / \sqrt{\frac{(s^2_{gr1} + s^2_{gr0})}{2}}$, where $\bar{x}_{gr1}$ (s^2_{gr1}) is the sample mean (variance) in the *HIGHPRTone$_{AVG}$* = 1 group and $\bar{x}_{gr0}$ (s^2_{gr0}) is the sample mean (variance) in the *HIGHPRTone$_{AVG}$* = 0 group. Standardised differences > 20 or < –20 indicate large differences (Rosenbaum and Rubin 1983, Ferri and Maber 2013, Hooghiemstra et al. 2015). Paired t-tests (Wilcoxon matched pairs signed-rank tests) are used to test differences in means (differences in medians). The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance. All variables are defined in Table 1. **Panel E** reports the results of Firm Fixed Effects models estimated for MATone$_{AVG}$, subsequent to propensity score matching. The dependent variable, *MATone$_{AVG}$*, is the average of *MATone$_{LM}$*, *MATone$_{Henry}$*, *MATone$_{Diction}$*, and *MATone$_{LIWC}$* on trading day *t*. All remaining variables are defined in Table 1. Firm, year, month, and day of the week fixed effects are included in all regressions (coefficients not reported). *BTM*, *LEV* and *SHTURN* are winsorised at 99%. The t-statistics are in parentheses. The asterisks indicate a 1% (***), 5% (**), and 10% (*) level of significance. All standard errors are clustered at firm level.